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PATENTS

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Applicant:	Crawford	Attorney Docket:	0975-003
Serial No:	09/825,107	Examiner:	Jorgensen, Leland, R.
Filed:	April 3, 2001	Art Unit:	2675
TITLE:	THUMB ACTUATED X-Y INPUT DEVICE		

By Facsimile with Confirmation by Mail
Assistant Commissioner for Patents
Washington D.C. 20231
Attention: Examiner Jorgensen

AMENDMENT AND RESPONSE TO OFFICE ACTION

GENERAL:

This paper is filed in response to the Office Action mailed December 19, 2002. The applicant is a small entity and requests a reduction of fees, however, it is believed that no fees are due as the response is filed before March 18, 2003, the three-month date for responding to this Office Action. Applicant has cancelled claims and added new claims. A check is included in accordance with the enclosed PTO/SB/06 form.

Applicant notes the return of the initialed copies of PTO Form SB/08A and 08B from the initial filing of this application.

Claims 1-22 were rejected in the First Office Action. However, Examiner noted that claims 9-11 contain allowable subject matter and would be allowed if rewritten. Applicant did not note any specific rejection of claim 13 beyond the rejection under 35 USC §112 of claims 3-19 based on language in independent claim 3. Presumably, claim 13 would be allowed if rewritten.

For the convenience of the Examiner, Assignee will respond to the Office Action in the order of the numbered comments by the Examiner.

In accordance with 37 CRF 1.121 and MPEP§ 714, Assignee is providing amendments by first commenting on the amendment, then by replacement material in clean form (without markings), followed by pages showing the changes.

Applicant appreciates the detail provided by the Examiner in this Office Action as it makes it possible to understand the asserted position of the Examiner so that Applicant can respond appropriately. It is particularly useful that Examiner has provided specific citations to the cited art and what Examiner considers the invitation to combine teachings from various references.

1 QUOTATION OF 35 USC § 112

No response is required.

2 REJECTION OF CLAIM 3-19 UNDER 35 USC §112, FIRST PARAGRAPH

Rejection of Claims 3 and 17

The Examiner objects to the use of the wording such as "pivotal movement of the thumb" as the Examiner finds this to be limited to movement purely in one axis as the Examiner presumes a hinge-type connection between the thumb and the hand (rather than a ball and socket connection). Claims 4-16 and 18-19 were rejected as they depended from rejected claims 3 and 17. In order to facilitate the movement of these claims to issuance, Applicant had revised the wording of the claims to avoid the use of the word pivot.

The relevant change in claim 3 is:

> *an x-y input sensor placed at the end of the input device distal to the user's wrist such that the x-y input is provided to the x-y input sensor by movements of the thumb primarily comprised of circumduction of the thumb's basal joint*

Likewise in Claim 17, the change is:

> *user can provide x-y input with the thumb tip by movement of the substantially straightened thumb without substantial flexing of the most distal joint in the user's thumb*

Thus, Applicant's amended claims remove this rejection for claims 3-17.

3 QUOTATION OF 35 USC §112, SECOND PARAGRAPH

No response is required.

4 REJECTION OF CLAIM 2 UNDER 35 USC §112, SECOND PARAGRAPH

The Examiner has rejected claim 2 because the Examiner finds the reference to height of the first segment and second segment to be ambiguous. Applicant has amended claim 2 to use means plus function language to add specificity to the claim as claim interpretation will now be construed to cover the corresponding structure described in the specification (see e.g. page 18, line 30 to page 19 line 23).

5 QUOTATION OF 35 USC § 102 (b) and (e)

No response is required.

6 REJECTION OF CLAIM 1 UNDER 35 USC § 102

Examiner rejected claim 1 as being anticipated by Hamling, USPN 5,648,798 asserting that Hamling teaches a device held in the hand in an open-grip posture with thumb pointing forward at top.

Applicant respectfully points out that the prior art teaches a different means of support for the hand and device, that the two inventions are intended to be thumb-operated in fundamentally differing ways.

Hamling states in column 2, lines 7-8 : "With the side of the hand comfortably resting on the support pad and thus the lower housing, the invention is passively held [down] by the weight of the user's hand and may be moved across the work surface..." and as shown in Figure 3, his device is intended to be supported by the work surface with an appendage of the device supporting the hand, whereas, Applicant's invention is designed to be held and supported within the hand as shown in Figure 2. To further aid in distinguishing the prior art, Applicant has amended claim 1 to specify: "wherein the input device is adapted to allow a user to use the input device while holding the input device in the user's hand with the hand supporting said input device in an neutral open-grip posture with the thumb held erect".

Additionally, Hamling intends the user's hand to be positioned such that the x-y input device is actuated with the palmar, or palm-facing, surface of the thumb by lateral and flexural thumb movements, as he shows in Figure 3, whereas Applicant explicitly intends the user to contact the x-y input device with the tip end of the thumb through 2-dimensional pivotal movements as seen in Figures 2 and 6, and as clarified in amended claim 1:

Claim 1 (amended) An input device for receiving an x-y input from a user's thumb having an interphalangeal joint and a thumb tip and input from at least one input actuator on the input device wherein the input device is adapted to allow a user to use the input device while holding the input device in the user's hand with the hand supporting said input device in an neutral open-grip posture with the thumb held erect and with the thumb generally collinear to a forearm on the same arm containing the user's thumb such that thumb tip can be placed in contact with an x-y actuator such that movement of the thumb tip provides x-y input while the interphalangeal joint of the thumb remains near its neutral, predominantly straightened position without undesirable flexural motion of the thumb.

The language of the claim as amended highlights the distinctions between the current invention and prior art devices such as described in Hamling. Accordingly, the 102 rejection of claim 2 should be removed.

7 REJECTION OF CLAIM 17 UNDER 35 USC § 102

Examiner rejected claim 17 as being anticipated by Leiper, USPN 6,184,862 for a device that receives x-y input through a touch pad operation by the user's thumb.

Again, Applicant respectfully points out that the cited prior art teaches a fundamentally different method of thumb-operated x-y input. Reviewing Leiper shows that the Leiper device is intended to be used with the user's hand to be positioned such that the x-y input device is actuated with the palmar surface of the thumb by lateral and flexural thumb movements (see e.g. Column 5, lines 42-52 and Figure 1), whereas Applicant explicitly intends the user to provide x-y input with the thumb tip by movement of the substantially straightened thumb without substantial flexing of the most distal joint in the user's thumb as seen in Figures 2 and 6. Applicant has amended claim 17 to help make this distinction apparent. Accordingly, the 102 rejection of claim 17 should be removed.

8 REJECTION OF CLAIMS 20-22 UNDER 35 USC § 102

In order to expedite the issuance of this application as a US patent, Applicant cancels pending claims 21 and 22. Applicant amends claim 20 to focus on a device with a "conductive capacitive sensing plate located in the bottom of a channel contoured to receive a user's finger". Capacitive touch switches are referenced at page 25 lines 13-22.

With these changes the 102 rejection based on Nakazawa (6,492,633) should be removed.

9 QUOTATION OF 35 USC § 103(a)

No response is required.

10 REJECTION OF CLAIM 2 UNDER 35 USC § 103(a)

Examiner rejected claim 2, asserting the obviousness of the palm fin over Hamling in view of Gasca, USPN Des. 381,970. Hamling teaches a support pad 110 upon which the user may rest his hand to align fingers and thumb with the three buttons x-y input device respectively. Gasca's design patent depicts an appendage that the Examiner construed as analogous to the palm fin of the present application.

Applicant notes that the Hamling's support pad is intended as a rest and alignment component for the hand and fingers, while Applicant teaches a "palm fin" feature that aligns different hand sizes to the appropriate finger and thumb locations by correlating the size of the hand's "grip" with the length or reach of the thumb. Applicant is not aware of anything in Hamling that adapts to different hand sizes. The use of the palm fin of the present invention is best described at page 18, line 30 to page 19, line 27 and in the relevant figures. Claim 2 has been amended to use means plus function language to add specificity to the claimed subject matter.

Applicant does not see the appendage visible in the Gasca design patent (US Des. 381,970) as analogous to the palm fin/positioning means of the present invention. Applicant presumes that the intended use of the Gasca computer mouse would position the finger tips of the hand so that the fingers can actuate the three elongated buttons on the device. To the extent that anything on Gasca adjusts for differences in finger length, presumably it would be the unusual length of these buttons. Following this reasoning, it seems that the thumb would be used to assist in grasping the device by placing the thumb in the channel that runs along the left side and wraps under the portion with the three buttons. Thus, the user wrist is the only contact with the appendage with the user's wrist. Perhaps the Gasca device can be or is intended to be held in some other orientation, but the proximity of the appendage of Gasca to the base of the mouse makes it implausible that the Gasca appendage is meant to serve the purpose of the palm fin of the present invention.

With this understanding of the prior art, Applicant asks that this rejection be removed.

11 REJECTION OF CLAIMS 3, 4, 6, 12 and 14 UNDER 35 USC § 103(a)

CLAIM 3

Examiner rejected claim 3 because the long axis of the main body section 200 is oriented substantially parallel to a line running through the forearm of the user to the tip of the user's thumb as taught by the prior art of Hamling.

Applicant respectfully notes that Hamling Figure 3 depicts a user's hand grasping a main body section with a long axis perpendicular to the work surface while the forearm and thumb are aligned parallel to the work surface. Thereby the long axis of the main body section is substantially perpendicular to the forearm and thumb, and not parallel thereto as taught by Applicant in claim 3.

Examiner further commented that Hamling's prior art has an x-y input device platform 205 that is substantially perpendicular to the main housing.

Applicant points out that Hamling teaches a main housing that is roughly cylindrical with the x-y input platform closing the top of that cylindrical shape, and thus being perpendicular to the main body in a more integral way as seen in Figure 3, whereas the Applicant's x-y input device platform protrudes perpendicularly from the main body in an "L" configuration as seen in Figure 2. This point is clarified in amended claim 3 part c

> *c) the housing further comprising a platform for containment of an x-y input device, the platform placed to be protruding outward from and substantially perpendicular to and slightly skewed to one side of the long axis of the main body section;*

Nothing in the art of record teaches or suggests the advantageous shape of the present invention. Nothing in the art of record teaches or suggests an x-y input sensor placed at the end of the input device, distal to the user's wrist, such that the x-y input is provided to the x-y input sensor by movements of the thumb primarily comprised of circumduction of the thumb's basal joint.

In paragraph 2 of this Office Action, the Examiner takes the position that pivotal movement of the thumb would be along one axis only, presumably the X direction. Thus, the Examiner appears to be estopped from asserting that Hamlin provides "x-y input to the track ball by pivotal movements of the thumb."

Further, Applicant has explicitly distinguished the variation of the present invention claimed in claim 3 from a trackball based device in the text page 22, line 1 to page 23, line 13. As described in the referenced text in combination with Figures 5 and 6, input in one dimension of the trackball (presumably the y axis) requires a cumbersome kicking motion.

Accordingly, the rejection of claim 3 should be removed

Claim 4

Examiner rejected claim 4 based on the reasoning applied to claim 3 and the assertion that Hamling depicts x-y input using thumb tip in Figure 3.

Applicant notes that Hamling, Figure 3, intends the user's hand to be positioned such that the x-y input device is actuated with the palmar surface of the thumb by lateral and flexural thumb movements, whereas Applicant explicitly intends the user to contact the x-y input device with the tip end of the thumb through 2-dimensional movements as seen in Figures 2 and 6.

Accordingly, the rejection of claim 4 should be removed.

Claim 6

Examiner rejected Claim 6 because of the reasoning behind the rejection of Claim 3, combined with the assertion that Leiper teaches thumb input to a touch pad and that a touch pad is a zero force touch switch.

Applicant notes that Leiper mentions a possible alternative with a thumb-based x-y input with a touch pad while Applicant teaches zero-dimensional switching input to be supplied by the user's finger for the purpose of emulating mouse button input signals, as described at page 13, lines 9-15:

> *The user holds the device by wrapping fingers around the main body portion with the thumb on top extending forward toward the upright portion of the device. The x-y input unit is controlled with light movements of the thumb tip. The index and middle fingers rest in grip-like channels on the bottom of the main body. (Note, the middle finger is sometimes called the second finger). These channels contain zero-force touch switches that act as left and right mouse buttons for the two fingers.*

The claims 3 and 6, as amended, make it explicit that the claimed device has at least one input actuator integrally formed into a recessed portion of at least one of the channels and

comprises a zero force touch switch to receive mouse-button inputs.

None of the art of record teaches or suggests the combination of elements found in claim 6. Accordingly, the rejection of claim 6 should be removed.

Claim 12

This claim was rejected for the reasons provided for rejecting claim 3 combined with the assertion that Leiper teaches input from the user's thumb to a touchpad.

Applicant notes that Hamling, and Leiper intend the user's hand to be positioned such that the x-y input device is actuated with the palmar surface of the thumb by lateral and flexural thumb movements, whereas Applicant explicitly intends the user to contact the x-y input device with the tip end of the thumb through 2-dimensional movements as shown in Figures 2 and 6. To highlight this distinction claim 12 now depends from claim 4.

The combination of limitations in claim 3, 4, and 12 make this distinction explicit and thus help distance the claims from any teaching or suggestion in the art of record. Accordingly, the rejection of claim 12 should be removed.

Claim 14

Examiner rejected claim 14 based on the assertion that Hamling depicts x-y input using thumb tip in Figure3, and that the x-y input device could be a thumb-actuated track ball in column 3, lines 51-61.

Applicant respectfully notes that Hamling, Figure 3, intends the user's hand to be positioned such that the x-y input device is actuated with the palmar surface of the thumb by lateral and flexural thumb movements, whereas Applicant explicitly sets forth in claim 3 a requirement for an "x-y input sensor placed at the end of the input device, distal to the user's wrist, such that the x-y input is provided to the x-y input sensor by movements of the thumb primarily comprised of circumduction of the thumb's basal joint" as seen in Figures 2 and 6. Claim 14 provides further detail concerning the embodiment of the present invention shown in Figure 9. The prior art does not teach or suggest the positioning of a track ball relative to the thumb as taught in the present application.

Accordingly, the rejection of claim 14 should be removed.

12 REJECTION OF CLAIM 5 UNDER 35 USC § 103(a)

Applicant cancels pending claim 5 without prejudice in order to expedite the issuance of this application as a patent.

13 REJECTION OF CLAIM 7 UNDER 35 USC § 103(a)

Examiner has rejected claim 7 based on the arguments applied to claims 3 and 6. Claims 7 and 8 represent major subsets of the devices covered by claim 6. Claim 7 adds the further limitation that the zero force touch switch detects the contact from the user's finger as described at page 24, line 27 to page 25 line 4.

> *In one embodiment of the present invention, the zero force touch switches for index and middle fingers (224 and 228) are immovable metal or composite contacts that detect finger contact from the fingertips or the proximity of the fingertips instead of requiring a forced click as with other pointing device buttons. Note that in the case where actual touch from the user, rather than proximity is required by the sensing mechanism, the actual force applied will be near zero and not zero. This distinction does not alter the fact that the zero force touch switch virtually eliminates the stress imposed on the user's hand by the repetitive action to actuate the zero force touch switch. The positions of the zero force switches may be designed to be adjustable within their respective channels to better accommodate variations in finger length.*

This text makes it clear that the concept of a zero force touch switch as used in the pending claims includes a switch that is actuated by contact from a user's finger. Thus, in order to provide clear guidance on the scope of the claims, it is beneficial for this claim to remain in the claim set. Applicant asserts that the claim as pending is allowable for at least the reasons proffered in support of amended claims 3 and 6.

14 REJECTION OF CLAIM 8 UNDER 35 USC § 103(a)

Examiner has rejected claim 7 based on the arguments applied to claims 3 and 6. Claims 7 and 8 represent major subsets of the devices covered by claim 6. Claim 8 adds the further limitation that the zero force touch switch detects the interruption of a beam of light.

It is important to draw the attention of the Examiner to the input actuators as opposed to the X-Y input sensor. Claims 6 and 8 add further limitations to the input actuators (such as

elements 224 and 228 of Figure 4). The teachings of Nakazawa relate to an x-y input device. It is not clear that one of ordinary skill in the art would be motivated to adapt the x-y input device of Nakazawa for use in a channel adapted to receive one of the user's fingers and accept mouse-button inputs.

Thus for this reason in addition for the reasons asserted with respect to claims 3 and 6, the rejection of claim 8 should be removed.

15 REJECTION OF CLAIM 15 and 16 UNDER 35 USC § 103(a)

Claim 15

The Examiner asserts that Claim 15 is obvious in light of a combination of four pieces of prior art (Hamling, Leiper, Adams, plus Logan (US Patent No. 5,327,161). Applicant notes that virtually all inventions contain elements that can be found in the prior art, a piece here and a piece there. Applicant is claiming a combination of elements that, as combined, provide an ergonomic input device. It is the synergy of arranging the elements as taught by Applicant that provides a new and non-obvious solution to a long-standing problem.

Applicant does not see where Logan teaches sensing a thumb at a perimeter input position. Applicant did a text search of the Logan patent and did not find a single mention of the word thumb. In contrast, Logan at column 3, lines 23-24 teaches that the "Touchpad 20 is typically operated with a conductive device such as a stylus or a finger".

Thus, even the addition of Logan does not render claim 3 obvious nor does any combination of cited art render claim 15 obvious. However, in order to further distance claim 15 from the art of record, Applicant has amended claim 15 to specify that the input to the perimeter input position comes from the thumb tip.

Claim 16

Examiner asserts that Logan Figure 6 teaches x-y input from the user's thumb is provided to a touchpad. Applicant disagrees with this assertion for the reasons provided in connection with Claim 15. Examiner asserts further that Logan Figure 6 has perimeter input positions of the touchpad actuated by pressing tactile cursor movement buttons so as to reduce accidental input of a perimeter input command. (see e.g. Figure 8 of the present application)

A closer look at Figure 6 as explained in Logan at column 7, line 52 et seq. shows that Figure 6 is actually a flow chart for a mode of operation that allows a user to maintain a drag mode operation by continuing to move the user's finger after a mechanical drag switch has been actuated. The advantage of this is that the user does not need to maintain pressure on a switch to maintain the drag mode.

Thus properly understood, Figure 6 of Logan adds nothing of relevance to the evaluation of the non-obviousness of claim 16.

However, in order to better define the invention claimed in claim 16, Applicant has amended the claim to provide additional detail. Claim 16 now depends from claim 3 rather than claim 15. The input comes from the thumb tip and the tactile cursor movement buttons are placed adjacent to the touchpad. Thus, claim 16 is neither taught nor suggested by the art of record and the obviousness rejection should be removed.

16 REJECTION OF CLAIM 18 and 19 UNDER 35 USC § 103(a)

Claim 18 adds to claim 17 the limitation that the device must have a scroll select touch switch. (See e.g. Figure 13 element 232 and Figure 14 of the present invention and the associated text including page 27, line 4 to page 28, line 6). The operation of this switch in the present invention changes how other input to the device is interpreted. Thus, there is an interaction between the input provided by the thumb and the input provided by the index finger.

> *control circuitry to interpret the input from the scroll-mode select touch switch and the finger touch switch in the index finger channel wherein the circuitry interprets the activation of the finger touch switch after the onset of a maintained activation of the scroll-mode select touch switch as a request for continued scrolling of a displayed image on the computer's image display for as long as both the scroll-mode select touch switch and the finger touch switch are activated*

In order to highlight this focus, Applicant has amended Claim 18 to use the term "scroll-mode select touch switch". The use of a scroll-mode select touch switch is in marked contrast with the scrolling feature of element 44 of the Leiper patent. This function is defined at column 8, line 64 to column 9, line 11 and is reproduced below.

> *Actuation of the pressure switch 44 by a single push will cause the Viewer software to display each image file in numeric order, one image at a time, beginning from the first image of the first series. Actuation of the pressure switch*

44 by pushing and holding the pressure switch 44 will cause the Viewer software to scroll through the images. The amount of pressure applied to pressure switch 44 will control the speed at which the Viewer software scrolls through the images in the series. The scrolling of images will halt when the end of an image series is reached (or the end of the set of all images reviewed during the study so far), whereupon the first image of the next series will be displayed, and the scrolling function will be terminated. The user may then step or scroll through the displayed next image series by again activating the pressure switch 44. In the preferred embodiment, the physician will be required to step through the entire sets of image series before rapid scrolling will be permitted. This will help to insure that each image is reviewed initially, to prevent missing a potentially relevant image during rapid scrolling.

Applicant fails to find any indication that Leiper teaches an interaction between the trigger switch 42 and the pressure switch 44. The trigger switch is used for various dictation functions and for selecting a mode of operation for the Leiper device. Applicant has not found any teaching in Leiper that links the operation of trigger switch 42 to scrolling the viewer.

Accordingly, the rejection of claims 18 and 19 should be removed.

17 & 18 ALLOWABLE SUBJECT MATTER FOR CLAIMS 9-11

Applicant notes with appreciation, the statement by the Examiner that no prior art describes the adjustable placement of the beam of light to allow adjustments to accommodate variations in finger length.

Applicant has amended claim 3 and addressed the objections of the Examiner for claims 3, 6 and 8 from which claims 9-11 depend. Claim 9 has been amended to track the language of amended claim 3. Applicant believes that claims 3, 6, and 8 are allowable and thus 9-11 are allowable.

Applicant has added new independent claim 26 and dependent claims 27 and 28. These claims contain the relevant limitations from original claims 9-11, the base claim and the intervening claims. The new claims focus on the adjustment of the beam of light to accommodate variations in finger length.